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EPA Superfund
Record of Decision:

CHEMFORM, INC.
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POMPANO BEACH, FL
09/22/1992

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Operable Unit One
Chemform, Inc. Site
Pompano Beach, Florida

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Chemform, Inc. Site in Pompano Beach, Florida. The remedy for Operable Unit One of the site was chosen in accordance with the Comprehensive Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) 42 U.S.C. Section 9601 et.seq., and to the extent practicable, the National Contingency Plan (NCP), 40 CFR Part 300. This decision is based on the administrative record file for this site.

In accordance with 40 CFR 300.430, the State of Florida, as represented by the Florida Department of Environmental Regulation (FDER), has been the support agency during the Remedial Investigation process for the Chemform site. Based upon comments received from FDER, EPA anticipates that
concurrence on this Record of Decision will be forthcoming; however, EPA has not yet received a formal letter of concurrence.

DESCRIPTION OF THE SELECTED REMEDY

This remedy applies to Operable Unit One at the site which pertains to the site-related groundwater contamination. Due to a lack of significant ground water contamination, a "No Action with Monitoring" alternative was chosen for ground water at the site. The ground water will be monitored quarterly for no less than one year in order to verify that no site-related release of
contaminants is occurring. If the results of the monitoring show that there is no unacceptable risk from exposure to site-related contaminants in the ground water, then the site will be considered for deletion from the National Priorities List (NPL). However, should groundwater monitoring indicate that the site poses a threat to human health or the environment, EPA, in consultation with the State of Florida, will reconsider the protectiveness of the "No Action with Monitoring" alternative and the feasibility of groundwater remediation will be re-evaluated.

DECLARATION STATEMENT

Based on the results of the Remedial Investigation and Risk Assessment conducted for Operable Unit One at the Chemform, Inc. site, EPA has determined that no remedial action is necessary to ensure the protection of human health and the environment, and that the selected remedy is protective of human health and the environment. The five-year review will not apply to this action because this remedy will not result in hazardous substances remaining on-site above health-based levels. EPA has determined that no remedial action is necessary at this time for Operable Unit One at this site.

Record of Decision

Summary of Remedial Alternative Selection

Operable Unit One

Chemform, Inc. Site

Pompano Beach, Florida

Prepared by:
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CHEMFORM, INC. SITE
POMPANO BEACH, FLORIDA

1.0 SITE NAME, LOCATION, AND DESCRIPTION

The Chemform, Inc. Site (Chemform) is located in Broward County at 1410 S.W. 8th Street, Pompano Beach, Florida (Figure 1). The site is located in a commercial-industrial area at the end of a dead-end street. Immediately adjacent to and east of Chemform is the Wilson Concepts Superfund site which is currently operated as a machine tool manufacturing facility (Figure 2). An alley about 6-10 feet wide on the Chemform property separates the Wilson Concepts and Chemform buildings. The site is bounded on the west by active tracks of the Seaboard Coastline Railroad, and on the north by S.W. 8th Street and the National Enquirer Property. On the south side of the site is an industrial access road and Carpenter Contractors of America, Inc., a roof truss manufacturing facility.

Chemform occupies approximately four acres in a highly industrialized area less than one half mile west of Interstate 95. The site is fenced and includes a 50,866 square-foot building. The closest area of residential zoning lies just east of I-95. The site is located within the city limits of Pompano Beach, which has a population of 72,400 (U.S.D.C., 1990).

The Pompano-Cypress Creek Canal lies an estimated 3000 feet south of the site. The Canal, operated by the South Florida Water Management District, flows east into the Biscayne Bay. Directly underlying the site is the Biscayne Aquifer, which supplies all potable water for Broward County and is designated a sole-source aquifer.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Operations began on the site in November 1967 upon completion of the building construction. Aerial photographs show the Chemform site and the area in general as undeveloped prior to 1967. The first facility at the site was a small precision machine shop operating under the name KECO, Inc., an acronym for Kismet Engineering Company. During its initial years of operation, KECO was involved in the machining of precision metal parts for the aerospace industry. Later, KECO began operating its first Electro-Chemical Milling (ECM) machine. After gaining experience with this machine, KECO converted a standard milling machine into an ECM machine. Success with this subsequent machine led eventually to the design, building, and marketing of a product line of ECM machines under the name of "Chemform".

On November 29, 1967, KECO sold the business to KMS Industries, Inc. (KMS) who then sold the property to New England Mutual Life

Insurance Company in 1969 in exchange for a long-term lease. New England Mutual Life remains the current owner of the site. Chemform, a division of KMS, manufactured electrochemical machining equipment and precision machined metal parts at the site from November 1967 to May 1976. Although operators of the site changed twice more after May 1976, the above-described manufacturing operation continued until 1985. From September 1985 through October 1986, the property was subleased to a company which operated a small-scale manufacturing business.

Operations at the site ceased entirely in 1985, but the property has been maintained in a potential operational status since that time with limited maintenance and upkeep. The property has undergone extensive renovation since late 1991, however, to prepare it for leasing.

Most of Chemform's business was with the aerospace industry as a certified repair station for the repair and refurbishment of turbine engine components. Chemform also provided services to utility companies that used turbine power plants. Chemform's other business operations consisted of the
design, manufacture, and marketing of electro-chemical machines for other industries involved in the fabrication of metal parts.

From 1967 to 1985, Chemform and its predecessor, KECO, were engaged in several processes that generated wastes or spent materials. Metal milling and mechanical shaping operations required cutting oils to lubricate and cool the parts and machines. Spent cutting oils were collected in stainless -steel vats and routinely pumped out by local reprocessing contractors. Organic

solvents were used for metal cleaning. Finished metal parts which required cleaning were processed through vapor degreasing equipment. Fiberglassing and painting operations also involved the use of solvents for thinning and cleanup. The electro-chemical machining operation involved a wet process which removed metal from the part being worked by using an electric current applied in an electrolyte solution. This process produced metal-bearing electrolyte solutions which were settled in tanks and centrifuged to remove the metal solids.

Process wastewater from ECM machine washdown and sanitary sewage was discharged to a septic tank/drain field system on the south side of the building. Other wastewaters were discharged to an open trench in the open field on the west side of the building. According to Chemform's response to an Industrial Wastewater Questionnaire, the company discharged about 50 gallons per day of wastewater (sodium chloride and sodium nitrate) in this manner until 1975. Cleanup of both the septic system and wastewater trench have been addressed under a Removal Action at the site. During the removal, data was collected on contaminant levels in soils. As a result of the soil
investigation, approximately 3000 cubic yards of soil were removed from the site.

In August 1985, EPA conducted a site screening investigation at the site. This investigation noted an outside drum rack in the paved shop yard west of the building with 19 drums, two of which were leaking. EPA also noted that approximately 47 other drums were stored in the shop yard along with four stainless steel tanks containing various quantities of oil and sludge. In July 1986, an EPA contractor, NUS Corporation, conducted a sampling investigation. After evaluating the sampling results, EPA proposed the site for the National Priorities List (NPL) in July 1988. In March 1989, the Chemform Site was formally included on the NPL.

On October 19, 1989, EPA and certain Potentially Responsible Parties (PRPs) entered into an Administrative Order on Consent (AOC) to conduct the Remedial Investigation/Feasibility Study (RI/FS) at the site. These PRPs are Chemform, Inc., New England Mutual Life Insurance Company, KMS Industries, and Smith International, Inc.

On April 17, 1990, EPA issued an Administrative Order to the PRPs to conduct a removal of drums found on the site and to investigate the effect of metal concentrations on the groundwater. The PRPs commenced the removal action in October 1990. EPA further ordered the PRPs to remove contaminated soil that may potentially affect the groundwater. This second phase of the removal action commenced in July 1991 and is scheduled for completion in late 1992.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Chemform site is located in an industrial section of Pompano Beach, Florida. The closest residentially zoned area is east of I-95, about ½ mile east of the site.

Community interviews were conducted by EPA in February 1990 to determine public interest in the Chemform site. The conclusion drawn from these interviews is that there is minimal interest in the Chemform site, probably due to the transient nature of the local population and the industrial setting of the site. EPA held an Availability Session at the Pompano Beach Multipurpose Center on December 4, 1990 to provide information about the site and answer questions on the RI to be conducted at the site. Seven people attended. Attendees of the session indicated an interest in learning more about the site and asked numerous questions about the Superfund process.

EPA released to the public the RI, Risk Assessment, and Proposed Plan for the Chemform site on July 22, 1992. EPA also made these documents available in both the administrative record and an information repository maintained at the EPA Records Center in Region IV, Atlanta, Georgia and at the Broward County Main Library in Fort Lauderdale, Florida. On July 20, 1992, EPA announced in the Ft. Lauderdale Sun Sentinel a public comment period as well as the availability of these documents. The public comment period occurred from July 22, 1992 through August 21, 1992. In addition, EPA conducted a public meeting on July 28, 1992. Representatives from EPA answered questions about the findings of the RI, Risk Assessment, and EPA's Proposed Plan for the site. Eleven local citizens attended the public meeting. A response to the comments received during the comment period is included in the Responsiveness Summary portion of this Record of Decision. The decision for this site is based on the administrative record. These community relations activities fulfill the statutory requirements for public participation contained in CERCLA Section 113(k)(2)(B)(i-v).

4.0 SCOPE AND ROLE OF OPERABLE UNIT

On April 7, 1992, EPA and the PRPs entered into the First Amendment to the RI/FS AOC dated October 19, 1989. This amendment included modifications to the AOC which reflected dividing the Site into two operable units. Operable Unit 1 (OU1) addresses any contamination in the groundwater at the Site that may pose a risk to the surrounding population. Operable Unit 2 (OU2) will address the soil at the site, the principal site-related threat. Dividing the site into two operable units allows the groundwater to be addressed while the removal action is ongoing. OU2 will be addressed after the completion of the removal action.

The response action in this ROD is for OU1. Groundwater analysis and results of the risk assessment suggest that "No Action with Monitoring" for the ground water will be protective of human health and the environment. The groundwater will be monitored quarterly for no less than one year to confirm that the few samples collected during the RI which contained contaminants above drinking water standards are not indicative of a release of contaminants from the Chemform site. If further groundwater monitoring indicates an unacceptable risk from contaminants, EPA will reconsider the protectiveness of the "No Action with Monitoring" alternative. The response actions are consistent with the National Contigency Plan (NCP) [40 CFR 300.430(e)].

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 CLIMATE

Pompano Beach is located in South Florida in an area dominated by tropical air masses. The average maximum annual temperature is 82.6 F; the average minimum annual temperature is 68 F; and the mean annual temperature is 75.6 F. The average annual precipitation for the area is 57.5 inches. Surface meteorological data obtained from the Miami International Airport indicate a
general westerly flow of air in this region.

5.2 SURFACE HYDROLOGY

Figure 3 displays potential surface drainage patterns on and near the site. The ground surface on the site slopes gently from north to south, with an average gradient of 1.4 feet across the site. Surficial soils on the site are sandy and highly permeable. The flat topography and permeable soils tend to minimize surface runoff from the site. Should surface runoff occur during heavy rainfalls, the general flow direction would be south, toward the Carpenter Contractors of America truss plant.

The closest surface water body to the site is Cypress Creek, which lies about 0.5 miles south of the site at its closest point, as shown in Figure 4. Cypress Creek, also known as C-14 Canal, is a short 7-8 mile branch of Pompano Canal, a part of the vast system of canals that provide drainage and flood control in south Florida. From its origin at the Pompano Canal, about 1.5 miles northeast of the site, Cypress Creek flows due south for about 1 mile and then in an easterly direction for about 6-7 miles until it empties into the Intercoastal Waterway. Cypress Creek is about 100 feet wide at its nearest point to the Chemform Site. Cypress Creek, as well as the other canals in this part of South Florida, is managed by the South Florida Water Management District (SFWMD) which is responsible for operation, maintenance, and monitoring of the canals. SFWMD maintains two flood control structures/gauging stations on Cypress Creek, one upstream, at about 1.7 miles west of the site, and one downstream, at about 1.2 miles east of the
site. The average flow for the period 1985 to 1991 was 120-129 cubic feet per second (cfs).

5.3 GEOLOGY AND HYDROGEOLOGY

The Chemform site is located on the Southern Atlantic Coastal strip which is a broad ridge that is underlain by Pleistocene-aged sand (Pamlico sand). In the vicinity of the site, the Pamlico sand occurs to a depth of approximately 50 feet, where the Anastasia Formation occurs as a slightly calcareous shelly sandstone. Below the Anastasia Formation, at a depth of approximately 200 feet, the Miocene-aged Hawthorn Group occurs. The Hawthorn Group is a thick unit consisting primarily of semi-consolidated clay and silt. Below the Hawthorn Group are highly transmissive Eocene-age limestones. Soil borings conducted during Phase I of the RI indicated no evidence of a confining unit within 50 feet of the surface.

The sands, sandstone, and limestone beneath the site form part of the Biscayne Aquifer, the primary drinking water source in

Broward and Dade Counties. Water table mapping conducted during the RI showed groundwater to be moving in a generally easterly direction at a rate of about 17 feet per year. The average horizontal gradient across the site was found to be about 6.3x10[-4], a relatively flat gradient. The average vertical hydraulic gradient was 10.6x10[-4]. This indicates a slight downward gradient but does not suggest that the immediate vicinity of the Chemform Site is an area of significant recharge to the underlying Biscayne aquifer.

Geologically, the Biscayne Aquifer is composed of soils of Holocene age and limestone, sandstone, and sand ranging in age from Pleistocene through late Miocene. In the site vicinity, it is primarily limestone and extends to a depth of approximately 80 feet below sea level. Solution cavities occupy a significant volume of the limestone in the Biscayne Aquifer, causing it to have high horizontal and vertical permeabilities. The lower part of the oolitic limestone is also cavity riddled and is identified by the presence of bryozoans. A hard cavernous limestone underlies the bryozoan layer. Because of the extremely high permeability of this limestone, all large capacity wells are completed in this part of the aquifer, generally 40 to 100 feet below land surface. Transmissivity of the Biscayne Aquifer ranges from 5.4x10[4] ft[2]/day where the aquifer is mostly sand to greater than 1.6x10[6] ft[2]/day in the limestone-rich areas. Regional flow of ground water is to the southeast; however, the direction of flow may be influenced by drainage canals or well fields. Flow direction in the site area appears to be influenced by the C-102 Canal, as it ranges in direction from east to northeast.

Regionally, the groundwater table is high, from 1.62 to 6.24 feet above mean sea level (USGS, 1988) and typically 6 to 8 feet below ground surface as is characteristic of South Florida. Site-specific information obtained by NUS during the 1986 study indicates that ground water is approximately four feet below grade at the site, while later studies indicate that the groundwater is approximately 3.0 to 3.5 feet below grade.

5.4 RESULTS OF THE REMEDIAL INVESTIGATION

The purpose of the Remedial Investigation (RI) was to gather and analyze sufficient data to characterize the site in order to perform the Baseline Risk Assessment, which determines the site's impact on human health and the environment. Both the RI and Risk Assessment have been used to determine whether remedial action is necessary at the site.

Six monitoring wells were installed in August 1990 to characterize groundwater quality (see Figure 5). Five monitoring wells were shallow (12 feet) and one well was deep (50 feet). One shallow well (MW-1) is located in an upgradient location to

characterize background groundwater quality. Four other shallow wells (MW-2,3,5,6) are located at the downgradient site boundary to characterize contamination leaving the site in shallow groundwater. A deep monitoring well (MW-4) is located downgradient and adjacent to shallow well MW-3 to characterize groundwater contamination at depth.

Groundwater quality sampling was conducted over several major events (Phase I, Phase II, and Phase IIB) and in two minor events (January 16, 1992 and February 18, 1992). Other than Phase I, each sampling event was designed to either verify the results of a previous sampling event or to address specific technical concerns arising from a previous sampling event. Table 1 on page 27 summarizes the groundwater quality sampling events.

Another objective of the January 16, 1992 sampling event was to evaluate the presence of groundwater contamination in the western part of the site. An area of organic subsurface soil contamination (35 feet by 55 feet) had been characterized in the western field during an earlier soil sampling phase. The area was delineated through headspace field screening of soil samples using an organic vapor analyzer (OVA). A temporary well (TW-1) was installed at the downgradient edge of the organic vapor contamination based on OVA readings (Figure 6).

Appendix A provides a tabular summary of the RI data collected at the site. This summary includes the contaminants and concentrations found at each of the groundwater monitoring well locations.

6.0 SUMMARY OF SITE RISKS

A Baseline Risk Assessment was conducted by EPA as part of the RI to estimate the health or environmental problems that could result if the Chemform site were not remediated. Results are contained in the Final Baseline Risk Assessment Report. A Baseline Risk Assessment represents an evaluation of the "No Action" alternative, in that it identifies the risk present if no remedial action is taken. The assessment considers environmental media and exposure pathways that could result in unacceptable levels of exposure now or in the foreseeable future. Data collected and analyzed during the RI provided the basis for the risk evaluation. The risk assessment process can be divided into four components: contaminant identification, exposure assessment, toxicity assessment, and risk characterization.

6.1 CONTAMINANTS IDENTIFICATION

The objective of contaminant identification is to screen the information that is available on hazardous substances present at

the site and to identify contaminants of concern (COCs) in order to focus subsequent efforts in the risk assessment process. COCs are selected based upon their toxicological properties, concentrations and frequency of occurrence at the site. Table 2 on page 28 presents the chemicals that the Risk Assessment identifies as potential contaminants of concern in the groundwater for the Chemform site.

6.2 EXPOSURE ASSESSMENT

An exposure assessment was conducted to estimate the magnitude of exposure to the groundwater contaminants of concern at the site and the pathways through which these exposures could occur. The results of this exposure assessment were combined with chemical-specific toxicity information to characterize potential risks.

Based upon the source characterization and soil investigation conducted under the RI and Removal Action, contaminated soil is the primary potential source of groundwater contamination at the Chemform site. The primary groundwater contaminants at the site are inorganic constituents. Metal-working operations at the site produced elevated concentrations of inorganic parameters such as chromium, nickel, and arsenic in the soils. Leaching of the soils is the likely contributor of inorganic constituents to groundwater at the site.

Significant local use of groundwater at or near the site is an unlikely occurrence because City water will likely continue to serve the site area. Although highly unlikely, a conservative future-use scenario is based on the assumption that a well could be installed on the Chemform site for use by industrial workers or residents as a potable water supply. On-site exposure to groundwater, under the future industrial or residential scenarios would represent the greatest potential exposure (i.e., greater than exposure in off-site locations). The exposure pathways evaluated quantitatively for this scenario were ingestion of drinking water and dermal contact through showering for the industrial use scenario and ingestion of drinking water, dermal contact and inhalation of volatile chemicals for the residential use scenario. The results of the exposure assessment are summarized in Table 3 and Table 4 on pages 29 and 30.

6.2.1 Well Inventory

A well inventory was conducted in a one-mile downgradient arc (i.e. 180 degrees) from the site (Figure 7). Water level measurements taken throughout the RI showed groundwater leaving the site in a generally easterly direction. No wells were identified in the inventory area, however three non-potable wells (recovery and irrigation wells) and one potable well system (Broward County 1B well field) were identified just outside of the survey area perimeter. Groundwater modeling conducted routinely by Broward County indicates that it would be unlikely that pumping of wellfield 1B, located about 0.7 mile southwest of the site, would affect the groundwater flow in the area of the site. In addition to the well inventory, city water line maps were obtained and show that the entire area falling within the scope of the well inventory is served by city water. As a result, there are no populations currently in the site area that are potentially exposed to

groundwater on or near the site.

Groundwater sampling results from the RI at the adjacent (downgradient) Wilson Concepts site indicate that groundwater parameters associated with Chemform are not migrating off site to any discernable extent. Also, future land use projections for the area indicate that the site will likely remain industrial. Conservative future exposure scenarios were developed for future potential industrial and residential use of the site. Those scenarios assume construction of a well on the site and subsequent groundwater exposure through ingestion, dermal absorption, and inhalation.

6.2.2 Current Land Use

Figure 8 shows current land use patterns in the vicinity of the site. As depicted in this figure, the area within a one-half mile radius of the site is bisected in a north-south direction by the Seaboard Coastline Railroad tracks. The area east of the tracks, within the one-half mile radius, is zoned "highway light industrial" and represents 52 percent of the total area of the circle. The area west of the tracks is currently zoned (with area percent in parentheses): commercial recreational (19 percent); multiple family residential (18 percent); and planned light
industrial/office/warehouse and planned commercial district (7 percent). The remaining 4 percent represents Cypress Creek Canal located at the southern edge of the circle.

Based on the results of the well inventory and the fact that the Chemform Site and surrounding area are served by public water supply lines, no current population in the area appears to be exposed to groundwater.

6.2.3 Future Land Use

The Future Land Use Plan for the City was evaluated in conjunction with an evaluation of established land use trends. The City's Future Land Use Plan is shown in Figure 9. This plan was adopted in 1989 and projects land use through 1998. It is updated every five years; however, the classifications are generally consistent for at least a ten year period. Figure 9 shows an
area on the western side of the railroad tracks from the Chemform site. This area is comprised of two land use

classifications, Commercial/Recreation (i.e., Pompano Race Track) and Medium Residential (i.e., 10 to 16 developments per acre, for Cypress Bend Condominium Complex). This projected land use is the same as the present land use for this area. The only anticipated change for the area is the addition of 500 living units to the Cypress Bend Condominium Complex to bring the total number of units to 2,000. With the present analysis of occupancy expected to remain the same, this would amount to approximately 4,000 people at this complex.

According to the City of Pompano Beach, there would be no plans for future residential use in the Chemform area, if there are no existing residential land uses in that area. The Chemform Site is in a commercial/industrial zoned area with no existing or past residential land use. Therefore, the most likely future land use for the Chemform site is industrial.

Under a future industrial scenario, workers would be expected to be in the site area for a normal 8-hour work day. Although the site is served by a public water supply, a conservative future exposure scenario is produced by looking at the installation and use of a potable well in an industrial setting onsite. Similarly, a residential scenario was examined for informational purposes, although EPA does not expect the site area to be converted for residential use in the foreseeable future. The conservative exposure assumption for an industrial setting forms the basis of the exposure assessment.

6.3 TOXICITY ASSESSMENT

The purpose of a toxicity assessment is to weigh available evidence regarding the potential of the contaminants of concern to cause adverse effects in exposed individuals and to provide an estimate of the relationship between the extent of exposure and the likelihood of adverse effects. The toxicity assessment is based on toxicity values which have been derived from quantitative dose-response information. Toxicity values for cancer are known as slope factors

(SFs) and values determined for noncarcinogenic effects are referred to as reference doses (RfDs).

Slope factors (SFs), which are also known as cancer potency factors (CPFs), have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. SFs, which are expressed in units of (mg/kg-day)[-1], are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. SFs are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied. SFs for the contaminants of concern at Chemform are listed in Table 5 (ingestion) and Table 6 (inhalation) on pages 31 and 32.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g. the amount of a chemical ingested from contaminated drinking water) can be comparedto the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have
been applied (e.g. to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur. RfDs for the contaminants of concern at Chemform are found in Table 7 (ingestion) and Table 8 (inhalation) on pages 33 and 34.

6.4 RISK CHARACTERIZATION

In this final step of the risk assessment, the results of the exposure and toxicity assessments are combined to provide numerical estimates of the carcinogenic and non-carcinogenic risks for the site. Nearly all of the carcinogenic and noncarcinogenic risk is produced by ingestion of groundwater under the potential industrial and residential scenarios.

Excess lifetime cancer risks are determined by multiplying the intake level with the slope factor. These risks are probabilities that are generally expressed in scientific notation (e.g. 1x10[-6] or 1E-6). An excess lifetime cancer risk of 1x10[-6] indicates that, as a plausible upper bound, an individual has a one in one million additional chance of developing cancer, over a 70-year lifetime, as a result of site-related exposure to a carcinogen. The National Contingency Plan (NCP) states that sites should be remediated to chemical concentrations that correspond to an upper-bound lifetime cancer risk to an individual not exceeding 10[-6] to 10[-4] excess lifetime risk. However, the upper boundary of the risk range is not a discrete line at 10[-4], although EPA generally uses 10[-4] in making risk management decisions in determining a need for remedial action at a site. A specific risk estimate around 10[-4] may be considered acceptable if justified based on site-specific conditions.

Chemical-specific risks are shown in Table 9 (industrial scenario) and Table 10 (residential scenario) on pages 35 and 36. The sum of the risks across both exposure pathways was calculated as follows:

Total Exposure Cancer Risk = Risk (Ingestion) + Risk (Dermal Contact) + Risk (Inhalation for Residential)

As shown in Table 9 and Table 10, the total cancer risk for all exposure pathways is 2E-4 for the potential industrial scenario and 5E-4 for the potential residential scenario. Under both scenarios, arsenic is responsible for a significant portion of the carcinogenic risk. This level
of carcinogenic risk is produced by arsenic (primarily through ingestion of drinking water), but the average arsenic concentration (24 ug/l) used to derive the chemical-specific risk is less than one-half of the federal maximum contaminant level (MCL) of 50 ug/l.

In order to characterize potential noncarcinogenic effects, estimated intake levels are compared with toxicity values. Potential concern for noncarcinogenic effects of a single contaminant in

a single medium is expressed as the Hazard Quotient (HQ). The HQ is a ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose. An HQ exceeding unity (1.0) indicates a potential for site-related noncarcinogenic health effects. By adding the HQs for all contaminants within a medium, or across all media to which a given population may be reasonably exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

The total Hazard Index, representing the noncarcinogenic risk for the site, is equal to 1 (Table 11 on page 37) for the potential industrial scenario and 3 (Table 12 on page 39) for the potential residential scenario. When segregated by toxic effects, the Hazard Index does not exceed 1 for any of the toxicity endpoints under the potential industrial use scenario. Under the residential use scenario, the Hazard Index for skin and vascular effects exceeds 1, but the other toxicity endpoints do not exceed 1.

Under both the industrial and residential scenarios, arsenic is responsible for a significant portion of the noncarcinogenic risk. In the case of the potential residential scenario, arsenic is responsible for the total Hazard Index exceeding unity (1).

As noted for the carcinogenic risk, the average arsenic concentration of 24 ug/l is less than one-half of the federal drinking water standard of 50 ug/l for arsenic. The only chemical which exceeds the acceptable risk of 1x10[-4] is arsenic. In addition, the carcinogenic endpoint on which the slope factor is based is a nonfatal form of skin cancer.

6.5 COMPARISON TO ARARS

Table 13 on page 41 compares groundwater parameter concentrations to Applicable or Relevant and Appropriate Requirements (ARARS) and To-Be-Considered (TBC) criteria for groundwater. Applicable requirements are those standards or other requirements that specifically address a pollutant or circumstance at a CERCLA site. Relevant and appropriate requirements are those standards or other requirements that, while not "applicable" to the site, address problems or situations similar to those encountered at the site and, therefore, are suitable for use at the site. Federal maximum contaminant levels (MCLs) and Florida drinking water standard (Chapter 17-550) are relevant and appropriate requirements since they address groundwater that is not currently used as a drinking water supply but which could potentially be used, although unlikely, as a water supply in the future. Proposed maximum contaminant levels, maximum contaminant level goals (MCLGs) and lifetime health advisories are to-be-considered criteria.

Table 13 also indicates that the maximum groundwater concentrations of arsenic and chromium exceeded ARARS. However, for each parameter, this exceedance was observed during the RI in only one sample. The maximum arsenic concentration (55 ug/l) was within 5 ug/l of the 50 ug/l standard; this falls within the accuracy range of the arsenic test. The exceedance of the chromium standard occurred in one sample collected on January 16, 1992.

Naphthalene and nickel also exceed to-be-considered criteria in one sample during the RI. The nickel exceedance was caused by one sample collected on January 16, 1992. Naphthalene was found in a temporary well used in the western part of the site to characterize an area of hydrocarbons.

6.6 ENVIRONMENTAL ASSESSMENT (EA)

The environmental assessment (EA), also known as the ecological assessment, is a qualitative and/or quantitative appraisal of the actual or potential effects of a hazardous waste site on plants and animals other than people and domesticated species. This EA will address the potential environmental risks associated with groundwater contamination at the Chemform site.

Cypress Creek, a drainage canal, is the closest surface water to the site. Comparison of groundwater quality data from the site to water quality standards applicable to Cypress Creek do not indicate that there would be a significant impact if groundwater from the site discharged into the canal. Table 14 on page 42 presents a comparison of average groundwater concentrations from the down-gradient wells to the surface water quality standards for Cypress Creek. Groundwater concentrations are the upper 95 percent confidence limit on the average groundwater concentrations of the preliminary list of chemicals of concern. This preliminary list Includes

aluminum and iron in addition to the final list of chemicals of potential concern; this is because chemicals other than those of potential human health concern may present environmental concerns. Only those chemicals that have Florida water quality standards associated with them are shown in Table 14. The average concentrations of aluminum, chromium, and iron in groundwater are above the associated surface water quality standards. As can be seen in Appendix A, however, aluminum and iron both had high background concentrations. Only one data point in ten was higher than the aluminum background (MW-1) concentration. Only three of ten data points were above the iron background concentration. Also, the average concentration of each parameter was heavily influenced by a single high concentration data point.

No wetlands were identified in the downgradient area between the site and Cypress Creek. One wetland was identified on the opposite side of Cypress Creek from the site, but would not likely be impacted because it is hydraulically separated from the site by Cypress Creek.

Considering the above factors, the dilution effect Cypress Creek would have on groundwater entering the stream, the long travel time for groundwater to reach Cypress Creek from the site, and the attenuation mechanisms that would tend to bind these metals, it is not anticipated that surface water quality standards in Cypress Creek would be exceeded due to inflow of groundwater from the Chemform site.

6.7 DISCUSSION OF UNCERTAINTY

Uncertainties about the numerical results of environmental risk assessments may be relatively large. These uncertainties often represent a value of at least one order of magnitude. Several categories of uncertainty are associated with site risk assessments. These uncertainties include the selection of substances used to characterize exposure, the toxicity values for each substance, and the exposure assessment for individual exposures. The fluctuations in contaminant levels detected over numerous sampling rounds create a significant uncertainty in the Chemform groundwater risk assessment.

Chromium

As seen in Appendix A, all values of total chromium were less than50 ug/l except for the January 16, 1992 result from monitoring well MW-5 which was 1,300 ug/l. This data point was inconsistent with the MW-5 results from the previous sampling round on August 14, 1991 (20 ug/l) and the subsequent sampling round on February 18, 1992 (34 ug/l). The presence of solids and turbidity in the January 16, 1992 sample were confirmed by laboratory analysis.

Nickel

Only two of 13 nickel values were above the detection limit (Appendix A). As with the chromium, the nickel results for MW-5 on January 16, 1992 (230 ug/l) was inconsistent with the previous sampling round on August 14, 1992 (less than 40 ug/l) and the subsequent sampling round on February 18, 1992 (55 ug/l). As with chromium, the elevated nickel concentration on January 16 may have been associated with the elevated solids in the sample rather than the groundwater.

Methylene Chloride

Methylene chloride was positively identified (i.e., found above blank concentration) only once during the RI, on March 14, 1991 in MW-3. The methylene chloride result for MW-3 on March 14 (690 ug/l) was inconsistent with the results from the previous sampling event on August 15, 1990 (less
than 1 ug/l) and the result from the subsequent sampling event on August 14, 1991 (less than 5 ug/l). In addition, methylene chloride is a very prevalent lab contaminant and was found in three lab blanks during the RI.

Arsenic

There is currently no published cancer slope value for arsenic which has been verified by EPA's Cancer Assessment Group. However, the cancer slope factor for arsenic was calculated using a proposed unit risk value for arsenic in IRIS. Most of these assumptions have been selected deliberately to be conservative. However, in a few cases where scientific information is unavailable, it is possible that one or more assumptions may not be conservative.

7.0 DESCRIPTION OF THE "NO ACTION" SELECTED ALTERNATIVE

EPA has determined, based on the results of the RI and Risk Assessment, that no action is needed for remediation of groundwater at the Chemform site. However, the future potential risk from exposure to the ground water at the site is close to the level at which EPA may consider taking action. Therefore, the groundwater at and around the site will be monitored quarterly for no less than one year. The purpose of this groundwater monitoring is to confirm that the few samples collected during the RI which contained contaminants above drinking water standards are not indicative of a release of contaminants from the Chemform site. Quarterly monitoring will occur at all existing RI wells and additional wells to be installed before the quarterly monitoring begins. The samples will be analyzed for volatile and extractable organic compounds and metals. EPA has estimated the cost of the "No Action with Monitoring" alternative to be $104,000 as shown in Table 15 on page 43. If monitoring indicates a potential threat to human health or the environment, EPA, in consultation with the State of Florida, will reconsider the protectiveness of this alternative and re-evaluate the need for protective measures or site remediation.

Groundwater monitoring will include the installation of approximately four additional monitoring wells downgradient of potential sources of groundwater contamination. There will be quarterly sampling of these new wells and existing monitoring wells at the site.

The new wells will be located downgradient of the following potential source areas of concern:

(1) the wastewater discharge trench

(2) adjacent to MW-5, screened in a deeper zone where high OVA readings were previously observed,

(3) the hydrocarbon area in the western portion of the site, and

(4) the area of the four stainless steel vats.

Groundwater monitoring will continue until the delineation and cleanup of the contaminated site soils as part of OU2 has been completed to EPA's satisfaction. The groundwater monitoring will occur for no less than one year.

8.0 DOCUMENTATION OF SIGNIFICANT DIFFERENCES

The selected remedy as presented in this decision document has no difference, significant or otherwise, from the proposed plan.

TABLES

Table 2

POTENTIAL CONTAMINANTS OF CONCERN AT THE CHEMFORM SITE

Inorganics

Arsenic
Barium
Cobalt *
Hexavalent Chromium
Nickel
Zinc

Organics

1,4-Dichlorobenzene
Methylene Chloride
Naphthalene
Xylene

. Cobalt is addressed qualitatively, not quantitatively

TABLE 15

ESTIMATED COST OF GROUNDWATER MONITORING CHEMFORM SITE

Construction of New Wells	
4 wells @ $6000 each	$24,000
Sampling and Analysis of Wells	
10 wells @ $2000/well/quarter	$80,000
Total Cost of Groundwater Monitoring	
For the required one year minimum	$104,000

APPENDIX A

REMEDIAL INVESTIGATION SAMPLING

DATA AND LOCATIONS